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10/773,087

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Koichi Yoshizawa

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EXAMINER

RILEY, MARCUS T

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/773,087

Applicant(s)

YOSHIZAWA ET AL.

Examiner

MARCUS T. RILEY

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 March 2009.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
4a) Of the above claim(s) 14, 17, 18 and 20-49 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☐ Claim(s) 1-13, 15, 16 and 19 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 04 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 12/28/2005; 07/05/2006; 11/13/2006.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. This office action is responsive to applicant's remarks received on August 25, 2008. Claims 1-13, 15, 16 & 19 remain pending. Claims 14, 17, 18 & 20-49 have been cancelled and withdrawn from consideration.

Response to Arguments

2. Applicant's arguments with respect to claims 1-16 & 19 have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

3. The indicated allowability of claim 17 is withdrawn in view of the newly discovered reference(s) to Kita et al. (US 5,502,579 hereinafter, Kita '579). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 1-13, 15, 16 & 19** rejected under 35 U.S.C. 103(a) as being unpatentable over Pop (US 7,251,058 B2, hereinafter Pop '058) in combination with Kita '579.

Regarding claim 1; Pop '058 defines a color separation method for determining quantities of a plurality of color inks in order to reproduce a arbitrary color with the plurality of color inks on a printing medium, the method comprising the steps of (See Figure 13 "*Another object of the present invention is to permit the selection of any combination of supported inks for creating a custom ink/media transform (e.g., C2M3YKR).*" column 4, lines 38-40, see also Figure 13, Steps 10, 20, 30, 70 and 90):

(a) defining an ink set that includes as useable inks a plurality of chromatic primary color inks that when used in combination can reproduce achromatic color, and at least one spot color ink of hue different from any of the plurality of chromatic primary color inks (See Figure 13, Steps 10, 20, 30, 70 and 90 "*The present invention is generally directed to a color-management/color-correction system and methodology for enabling users to create custom ink/media color transforms using, for example and not limitation, up to eight (8) different process ink colors which may include multi-density process colors (e.g., C2M2YK, C3M3YKROGB) in a printer. The proposed methodology can be generalized for the building of n-different process ink color transforms.*" column 1, lines 8-15);

(b) determining a plurality of reproduction colors to be reproduced on a print medium according to a plurality of input colors within a chromatic primary color space, a term "reproduction color" denoting a color to be reproduced on the print medium according to any one input color, a term "color separation ink quantity set" denoting a combination of ink quantities of the ink set for reproducing a reproduction color on the print medium, a term "chromatic primary color space" denoting a color space having base vectors representing ink quantities of the plurality of chromatic primary color inks ("*Next, a chroma screen is applied only to non-primary (ROBG) colors (FIG. 8). The purpose of this screen is to ensure that only primary colors are used near the neutral areas of the gamut; that is, it is not preferable to use non-primary inks to reproduce colors where primary inks will suffice because non-primary inks are needed to extend the gamut volume.*" column 9, lines 23-29). See also ("*As stated previously, the primary objective in*

measuring the target patches and generating a CIELab data set is to render (or "build") a color gamut that represents the operational limits of the printer for the ink/media combination being used." column 10, lines 13-17);

wherein step (b) includes the steps of:

(b1) determining an outermost shell color separation ink quantity set associated with outermost shell chromatic color, where the outermost shell chromatic color refers to chromatic color at an outermost shell location within the primary color space, the outermost shell color separation ink quantity set being used for reproducing extended chromatic color that is reproducible with the ink set and that has higher saturation than the outermost shell chromatic color ("*Shell screening is the key to selecting those target patches that will contribute to the final data set and those that won't. It is applied only to the non-primary (ROGB) colors. Target patches are generated with non-primary (ROGB) consist of a mixture with primary colors (CMY not black (K)) and receive for example, 25%, 50%, 75% and 100% ink levels. A first order selection is made using for patches that contain 100% of the non-primary color. Obviously, this will generate a tiny gamut. However, any target patch whose color values fall within this small gamut and which contains less than 100% of the non-primary ink will be discarded. A second order selection is made for patches that contain 75% of the non-primary ink. The gamut areas is now somewhat larger, but again any target patch whose color values fall within the gamut and which contain less than 75% of the non-primary ink will be discarded. This process is repeated for all non-primary color ink levels of the color set. Once it is complete, many aliases (the same color patch with different ink combinations) will be removed and the remaining data set will be "regularized" to provide smooth transitions into and out of the non-primary areas of the gamut.*" column 9, lines 49-67 thru column 10, lines 1-2);

and (b2) determining the plurality of reproduction colors associated respectively with the plurality of input colors within the primary color space, based on relationship between the outermost shell chromatic color and the outermost shell color separation ink quantity set ("*Shell screening is the key to selecting those target patches that will contribute to the final data set and those that won't. It is applied only to the non-primary (ROGB) colors. Target patches are generated with non-primary (ROGB) consist of a mixture with primary colors (CMY not black (K)) and receive for example, 25%, 50%, 75% and 100% ink levels. A first order selection is made using for patches that contain 100% of the non-primary color.*" column 9, lines 49-56);

wherein the step (b1) includes the steps of establishing an upper limit of useable ink quantity per unit of area of the print medium as an ink duty limit (*"The primary objective in measuring the target patches and generating a data set of CIElab values is to render (or "build") a color gamut that represents the operational limits of the printer for the ink/media combination being used."* column 8, lines 21-24);

and determining the extended chromatic color as a color represented by an extended chromatic color vector of greater length having a same direction as an outermost shell chromatic color vector representing the outermost shell chromatic color in the primary color space, and determining the outermost shell color separation ink quantity set for reproducing the extended chromatic color (*"Next, a chroma screen is applied only to non-primary (ROBG) colors (FIG. 8). The purpose of this screen is to ensure that only primary colors are used near the neutral areas of the gamut; that is, it is not preferable to use non-primary inks to reproduce colors where primary inks will suffice because non-primary inks are needed to extend the gamut volume. The core of the gamut is where the primaries alone are used, with CMY colors residing at the top and middle of the gamut and black gradually filling in at the bottom. Non-primaries are restricted to the outside portions of the gamut, in the area surrounding the core, adding additional gamut volume and surface area near their respective natural hues. The chroma screen helps to ensure that the non-primary colors are used mostly at the outer boundaries of the gamut, less often in the middle areas, very little near the gamut core, and not at all within the core itself where the primary colors are dominant. Any color patches with values that violate these criteria are discarded."* column 9, lines 23-40).

wherein determination of the extended chromatic color and the outermost shell color separation ink quantity set is performed so as to meet the following condition: (i) the outermost shell color separation ink quantity set is within the ink duty limit (*"An ink saturation level that will be used in creating the ink/media transform is chosen. This parameter is determined empirically for the chosen media. A set of coverage samples for each of the inks in the color set is printed with an increasing density, or saturation, of ink applied to produce a "ramp". The user chooses the optimum ink saturation for each color based on a number of visual criteria well known in the art. Too much ink can cause image artifacts such as bleeding, show-through, wrinkled surface texture and haze. Too little ink reduces the color gamut for the ink/media transform being created and can result in image reproduction with colors that look*

dull or faded. The ink saturation scale ranges from 0-100% coverage; however, the maximum ink level selected seldom exceeds an actual value of 250% coverage. " column 7, lines 7-21).

and (c) determining a plurality of color separation ink quantity sets for reproducing the plurality of reproduction colors, wherein the step (c) including, for each reproduction color, the steps of: (c1) calculating a lightness parameter value correlated to lightness of the reproduction color ("In one particular methodology, the **generating of an ink/media transform for a target device in which an ink type, a color set media type and an ink saturation level have all been selected**, a set of linearization ramps have been generated and measured, and a set of target patches have been generated and measured, may comprise the steps of: screening the set of target patches, wherein each generated patch has corresponding Lab values, wherein the step of screening each generated target patch comprises the steps of: (a) **accepting a patch having a threshold lightness value (L) value for a preselected ink coverage value and discarding patches having an ink coverage value that is higher than the threshold lightness value (L)...** " column 5, lines 16-28, See also Fig. 7 and Fig. 13 Step 70);

and (c2) adjusting an ink quantity of the spot color ink in the color separation ink quantity set in accordance with the lightness parameter value, so as to reduce the ink quantity at a rate of change greater than a rate of change of the lightness parameter value when the lightness parameter changes in a lighter direction (See Fig. 13, Step 70 "*The next screen is the dark patch removal (FIG. 10) and is applied only to the primary (CMY) colors. The first part of this screening process is accomplished by **eliminating patches with color values that include a non-zero value for K (black) ink only (pure black patches)**. The last part of the dark patch removal process is the discard of the CMYK patches that have large chroma value. Only the CMYK patches having minimum chroma and separated by at least $\Delta E=2$ apart are been used in the transform building process.*" column 10, lines 3-11).

Pop '058 does not expressly disclose wherein the reproduction color is a color reproduced by a provisional color separation ink quantity set derived by multiplying the outermost shell color separation ink quantity set for the outermost shell chromatic color having a same vector as the input color in the primary color space, by a ratio of a length of the input color vector to a length of the outermost shell chromatic color vector.

Kita '709 discloses wherein the reproduction color is a color reproduced by a provisional color separation ink quantity set derived by multiplying the outermost shell color separation ink quantity set for the outermost shell chromatic color having a same vector as the input color in the primary color space, by a ratio of a length of the input color vector to a length of the outermost shell chromatic color vector (See Figure 1, #4 wherein #4 is the UCR Ratio Calculation Means and the chroma signal C^* is input to an UCR ratio calculation means 4, which determines an UCR ratio α by an operation using parameters supplied from a parameter input means 7. See also Figure 2 wherein Fig. 2 shows the parameters are given as two points (C^*_1, Ak_1), (C^*_2, Ak_2) on a C^* - a coordinate system. A relationship $Ak_1 > Ak_2$ holds in general and, to reproduce gray singly by black, it is desired that Ak_1 be equal to 1.)

Pop '058 and Kita '709 are combinable because they are from same field of endeavor of color image processing system ("*The present invention relates to a color image processing method and apparatus for converting three color signals read by an image input device to color image recording signals of a plurality of colors including black.*" Kita '709 at column 1, lines 8-11).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the color image processing system as taught by Pop '058 by adding a wherein the reproduction color is a color reproduced by a provisional color separation ink quantity set derived by multiplying the outermost shell color separation ink quantity set for the outermost shell chromatic color having a same vector as the input color in the primary color space, by a ratio of a length of the input color vector to a length of the outermost shell chromatic color vector as taught by Kita '709. The motivation for doing so would have been because it is advantageous to provide a color image processing method and apparatus which can perform correct color reproduction by a simple calculation without the need of empirical parameter adjustments ("*An object of the invention is to provide a color image processing method and apparatus which can perform correct color reproduction by a simple calculation without the need of empirical parameter adjustments, and which can perform black addition*

and under color removal without causing an unnatural chroma gap between an achromatic area and a chromatic area..” Kita ‘709 at column 2, lines 50-56). Therefore, it would have been obvious to combine Pop ‘058 with Kita ‘709 to obtain the invention as specified in claim 1.

Regarding claim 2; Pop ‘058 discloses a color separation method wherein the step (c2) includes adjusting the ink quantity of the spot color ink such that decrease of the spot color ink quantity with respect to change of the lightness parameter value exceeds decrease of the chromatic primary color ink quantities with respect to the change of the lightness parameter value (See Fig. 13, Step 70 *“The next screen is the dark patch removal (FIG. 10) and is applied only to the primary (CMY) colors. The first part of this screening process is accomplished by eliminating patches with color values that include a non-zero value for K (black) ink only (pure black patches). The last part of the dark patch removal process is the discard of the CMYK patches that have large chroma value. Only the CMYK patches having minimum chroma and separated by at least $\Delta E=2$ apart are been used in the transform building process.”* column 10, lines 3-11).

Regarding claim 3; Pop ‘058 does not expressly disclose a color separation method according to claim 1, wherein the step (c2) includes adjusting the spot color ink quantity so as to decrease at a greater rate than a rate proportional to the lightness parameter value.

Kita ‘709 discloses a color separation method according to claim 1, wherein the step (c2) includes adjusting the spot color ink quantity so as to decrease at a greater rate than a rate proportional to the lightness parameter value (*“The lightness/chromaticity separation means 2 is a means for converting the signals R_F , G_F and B_F to signals on a coordinate system which is “iso-perceptive” (a distance between two points on a coordinate system is proportional to a perceptual color difference) and device-independent.”* column 5, lines 20-27).

Pop ‘058 and Kita ‘709 are combinable because they are from same field of endeavor of color image processing system (*“The present invention relates to a color image processing method and apparatus for*

converting three color signals read by an image input device to color image recording signals of a plurality of colors including black.” Kita ‘709 at column 1, lines 8-11).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the color image processing system as taught by Pop ‘058 by adding a wherein the step (c2) includes adjusting the spot color ink quantity so as to decrease at a greater rate than a rate proportional to the lightness parameter value as taught by Kita ‘709. The motivation for doing so would have been because it is advantageous to provide a color image processing method and apparatus which can perform correct color reproduction by a simple calculation without the need of empirical parameter adjustments (*“An object of the invention is to provide a color image processing method and apparatus which can perform correct color reproduction by a simple calculation without the need of empirical parameter adjustments, and which can perform black addition and under color removal without causing an unnatural chroma gap between an achromatic area and a chromatic area..”* Kita ‘709 at column 2, lines 50-56). Therefore, it would have been obvious to combine Pop ‘058 with Kita ‘709 to obtain the invention as specified in claim 1.

Regarding claim 4; Pop ‘058 discloses a color separation method wherein the step (c2) includes adjusting the spot color ink quantity such that actual ink quantity of the spot color ink is smaller than a hypothetical ink quantity of the spot color ink when the lightness parameter value is in a predetermined brightest range, the hypothetical ink quantity being defined to be ink quantity of a spot color ink included in the color separation ink quantity set for reproducing the reproduction color and being obtainable by adjusting ink quantity of each ink in the color separation ink quantity set so as to minimize a sum of ink quantities (*“An ink saturation level that will be used in creating the ink/media transform is chosen. This parameter is determined empirically for the chosen media. A set of coverage samples for each of the inks in the color set is printed with an increasing density, or saturation, of ink applied to*

produce a "ramp". The user chooses the optimum ink saturation for each color based on a number of visual criteria well known in the art. Too much ink can cause image artifacts such as bleeding, show-through, wrinkled surface texture and haze. Too little ink reduces the color gamut for the ink/media transform being created and can result in image reproduction with colors that look dull or faded. The ink saturation scale ranges from 0-400% coverage; however, the maximum ink level selected seldom exceeds an actual value of 250% coverage. " column 7, lines 7-21).

Regarding claim 5; Pop '058 discloses a color separation method wherein the step (c2) includes adjusting the spot color ink quantity such that a proportion of actual ink quantity of the spot color ink to a hypothetical ink quantity of the spot color ink decreases monotonically with respect to change of the lightness parameter value in the lighter direction, the hypothetical ink quantity being defined to be ink quantity of a spot color ink included in the color separation ink quantity set for reproducing the reproduction color and being obtainable by adjusting ink quantity of each ink in the color separation ink quantity set so as to minimize a sum of ink quantities ("An ink saturation level that will be used in creating the ink/media transform is chosen. **This parameter is determined empirically for the chosen media. A set of coverage samples for each of the inks in the color set is printed with an increasing density, or saturation, of ink applied to produce a "ramp".** The user chooses the optimum ink saturation for each color based on a number of visual criteria well known in the art. Too much ink can cause image artifacts such as bleeding, show-through, wrinkled surface texture and haze. Too little ink reduces the color gamut for the ink/media transform being created and can result in image reproduction with colors that look dull or faded. **The ink saturation scale ranges from 0-400% coverage; however, the maximum ink level selected seldom exceeds an actual value of 250% coverage.** " column 7, lines 7-21).

Regarding claim 6; Pop '058 discloses a color separation method wherein the step (c2) includes adjusting the spot color ink quantity such that the ink quantity of the spot color ink is set zero in a first range which is a brightest part of an entire range of the lightness parameter value (See Fig. 13, Step 70 "The next screen is the dark patch removal (FIG. 10) and is applied only to the primary (CMY) colors. The first part of this screening process is accomplished by **eliminating patches with color values that include a non-zero value for K**

(black) ink only (pure black patches). The last part of the dark patch removal process is the discard of the CMYK patches that have large chroma value. Only the CMYK patches having minimum chroma and separated by at least $\Delta E=2$ apart are been used in the transform building process." column 10, lines 3-11).

Regarding claim 7; Pop '058 discloses a color separation method wherein the lightness parameter value is a maximum value assumable by ink quantity of the spot color ink when reproducing the reproduction color (*"An ink saturation level that will be used in creating the ink/media transform is chosen. This parameter is determined empirically for the chosen media. A set of coverage samples for each of the inks in the color set is printed with an increasing density, or saturation, of ink applied to produce a "ramp". The user chooses the optimum ink saturation for each color based on a number of visual criteria well known in the art. Too much ink can cause image artifacts such as bleeding, show-through, wrinkled surface texture and haze. Too little ink reduces the color gamut for the ink/media transform being created and can result in image reproduction with colors that look dull or faded. The ink saturation scale ranges from 0-400% coverage; however, the maximum ink level selected seldom exceeds an actual value of 250% coverage.*" column 7, lines 7-21).

Regarding claim 8; Pop '058 discloses a color separation method wherein the step (c2) comprises the steps of (c2-1) calculating a temporary ink quantity of the spot color ink from the lightness parameter value (*"An ink saturation level that will be used in creating the ink/media transform is chosen. This parameter is determined empirically for the chosen media. A set of coverage samples for each of the inks in the color set is printed with an increasing density, or saturation, of ink applied to produce a "ramp". The user chooses the optimum ink saturation for each color based on a number of visual criteria well known in the art. Too much ink can cause image artifacts such as bleeding, show-through, wrinkled surface texture and haze. Too little ink reduces the color gamut for the ink/media transform being created and can result in image reproduction with colors that look dull or faded. The ink saturation scale ranges from 0-400% coverage; however, the maximum ink level selected seldom exceeds an actual value of 250% coverage.*" column 7, lines 7-21).

(c2-2) determining temporary ink quantities for the chromatic primary color inks which in conjunction with the temporary ink quantity of the spot color ink are needed to reproduce the

reproduction color, thereby obtaining a temporary ink quantity set ("An ink saturation level that will be used in creating the ink/media transform is chosen. **This parameter is determined empirically for the chosen media.** A set of coverage samples for each of the inks in the color set is printed with an increasing density, or saturation, of ink applied to produce a "ramp". The user chooses the optimum ink saturation for each color based on a number of visual criteria well known in the art. Too much ink can cause image artifacts such as bleeding, show-through, wrinkled surface texture and haze. Too little ink reduces the color gamut for the ink/media transform being created and can result in image reproduction with colors that look dull or faded. **The ink saturation scale ranges from 0-100% coverage; however, the maximum ink level selected seldom exceeds an actual value of 250% coverage.** " column 7, lines 7-21).

and (c2-3) adopting the temporary ink quantity set per se as the color separation ink quantity set when the temporary ink quantity set is within ink duty limits which limit an upper value of ink quantity useable per unit of area of the print medium, and when the temporary ink quantity set exceeds the ink duty limits, correcting the temporary ink quantity set so as to meet the ink duty limits to determine the color separation ink quantity set ("An ink saturation level that will be used in creating the ink/media transform is chosen. **This parameter is determined empirically for the chosen media.** A set of coverage samples for each of the inks in the color set is printed with an increasing density, or saturation, of ink applied to produce a "ramp". The user chooses the optimum ink saturation for each color based on a number of visual criteria well known in the art. Too much ink can cause image artifacts such as bleeding, show-through, wrinkled surface texture and haze. Too little ink reduces the color gamut for the ink/media transform being created and can result in image reproduction with colors that look dull or faded. **The ink saturation scale ranges from 0-100% coverage; however, the maximum ink level selected seldom exceeds an actual value of 250% coverage.** " column 7, lines 7-21).

Regarding claim 9; Pop '058 discloses a color separation method wherein the ink set includes first and second spot color inks, the step (c1) includes calculating the lightness parameter value for each of the first and second spot color inks independently, the step (c2-1) includes determining temporary ink quantities of the first and second spot color inks based on the lightness parameter value for each of the first and second spot color inks, and the step (c2-3)

includes, when the temporary ink quantity set exceeds the ink duty limits, determining the color separation ink quantity set such that, within a two-dimensional color space defined by ink quantities of the first and second spot color inks, a color coordinate point defined by color separation ink quantities of the first and second spot color inks is present inside a range that meets the ink duty limits and situated in proximity to another color coordinate point defined by the temporary ink quantities of the first and second spot color inks (*"An ink saturation level that will be used in creating the ink/media transform is chosen. This parameter is determined empirically for the chosen media. A set of coverage samples for each of the inks in the color set is printed with an increasing density, or saturation, of ink applied to produce a "ramp". The user chooses the optimum ink saturation for each color based on a number of visual criteria well known in the art. Too much ink can cause image artifacts such as bleeding, show-through, wrinkled surface texture and haze. Too little ink reduces the color gamut for the ink/media transform being created and can result in image reproduction with colors that look dull or faded. The ink saturation scale ranges from 0-100% coverage; however, the maximum ink level selected seldom exceeds an actual value of 250% coverage.*" column 7, lines 7-21).

Regarding claim 10; Pop '058 discloses a color separation method wherein the step (c2-3) includes, when the temporary ink quantity set exceeds the ink duty limits, determining the color separation ink quantity set such that, within the two-dimensional color space relating to ink quantities of the first and second spot color inks, a color coordinate point defined by color separation ink quantities of the first and second spot color inks is present inside a range that meets the ink duty limits, and such that a ratio of the color separation ink quantities of the first and second spot color inks is equal to a ratio of the temporary ink quantities of the first and second spot color inks (*"An ink saturation level that will be used in creating the ink/media transform is chosen. This parameter is determined empirically for the chosen media. A set of coverage samples for each of the inks in the color set is printed with an increasing density, or saturation, of ink applied to produce a "ramp". The user chooses the optimum ink saturation for each color based on a number of visual criteria well known in the art. Too much ink can cause image artifacts*

such as bleeding, show-through, wrinkled surface texture and haze. Too little ink reduces the color gamut for the ink/media transform being created and can result in image reproduction with colors that look dull or faded. The ink saturation scale ranges from 0-400% coverage; however, the maximum ink level selected seldom exceeds an actual value of 250% coverage. " column 7, lines 7-21).

Regarding claim 11; Pop '058 discloses a color separation method wherein the ink set includes a plurality of the spot color inks, and the step (c2) includes performing adjustment of each ink quantity of the spot color inks by means of limiting a value assumable by a specific spot color ink parameter to a smaller range in association with higher lightness indicated by the lightness parameter value, the spot color ink parameter having characteristic of increasing in association with greater ink quantities of a spot color ink included in the color separation ink quantity set ("*...the generating of an ink/media transform for a target device in which an ink type, a color set media type and an ink saturation level have all been selected, a set of linearization ramps have been generated and measured, and a set of target patches have been generated and measured, may comprise the steps of: screening the set of target patches, wherein each generated patch has corresponding Lab values, wherein the step of screening each generated target patch comprises the steps of: (a) accepting a patch having a threshold lightness value (L) value for a preselected ink coverage value and discarding patches having an ink coverage value that is higher than the threshold lightness value (L); (b) accepting a patch having at least a threshold chroma value for a preselected ink coverage value and discarding patches having an ink coverage value that is higher than the threshold chroma value...*" column 5, lines 16-31).

Regarding claim 12; Pop '058 discloses a color separation method wherein the spot color ink contains colorant different from colorants of the plurality of chromatic primary color inks (See Figure 13, Steps 10, 20, 30, 70 and 90 "*The present invention is generally directed to a color-management/color-correction system and methodology for enabling users to create custom ink/media color transforms using, for example and not limitation, up to eight (8) different process ink colors which may include multi-density process colors (e.g., C2M2YK,*

C3M3YKROGB) in a printer. The proposed methodology can be generalized for the building of n-different process ink color transforms." column 1, lines 8-15);

Regarding claim 13: Pop '058 discloses a color separation method according to claim 1, wherein the spot color ink is able to reproduce higher saturation than a mixture of the chromatic primary color inks when a hue reproducible by the spot color ink is reproduced by the mixture of the plurality of chromatic primary color inks ("*An ink saturation level that will be used in creating the ink/media transform is chosen. This parameter is determined empirically for the chosen media. A set of coverage samples for each of the inks in the color set is printed with an increasing density, or saturation, of ink applied to produce a "ramp". The user chooses the optimum ink saturation for each color based on a number of visual criteria well known in the art. Too much ink can cause image artifacts such as bleeding, show-through, wrinkled surface texture and haze. Too little ink reduces the color gamut for the ink/media transform being created and can result in image reproduction with colors that look dull or faded. The ink saturation scale ranges from 0-400% coverage; however, the maximum ink level selected seldom exceeds an actual value of 250% coverage.*" column 7, lines 7-21).

and wherein determination of the extended chromatic color and the outermost shell color separation ink quantity set is performed so as to meet the following condition: (i) the outermost shell color separation ink quantity set is within the ink duty limit ("*Next, a chroma screen is applied only to non-primary (ROBG) colors (FIG. 8). The purpose of this screen is to ensure that only primary colors are used near the neutral areas of the gamut; that is, it is not preferable to use non-primary inks to reproduce colors where primary inks will suffice because non-primary inks are needed to extend the gamut volume. The core of the gamut is where the primaries alone are used, with CMY colors residing at the top and middle of the gamut and black gradually filling in at the bottom. Non-primaries are restricted to the outside portions of the gamut, in the area surrounding the core, adding additional gamut volume and surface area near their respective natural hues. The chroma screen helps to ensure that the non-primary colors are used mostly at the outer boundaries of the gamut, less often in the middle areas, very little near the gamut core, and not at all within the core itself where the primary colors are dominant. Any color patches with values that violate these criteria are discarded.*" column 9, lines 23-40).

Regarding claim 15; Pop '058 discloses a color separation method wherein determination of the extended chromatic color and the outermost shell color separation ink quantity set is performed so as to additionally meet the following condition: (ii) length of the extended chromatic color vector is the greatest length within a range reproducible by the ink set (*"Next, a chroma screen is applied only to non-primary (ROBG) colors (FIG. 8). The purpose of this screen is to ensure that only primary colors are used near the neutral areas of the gamut; that is, it is not preferable to use non-primary inks to reproduce colors where primary inks will suffice because non-primary inks are needed to extend the gamut volume. The core of the gamut is where the primaries alone are used, with CMY colors residing at the top and middle of the gamut and black gradually filling in at the bottom. Non-primaries are restricted to the outside portions of the gamut, in the area surrounding the core, adding additional gamut volume and surface area near their respective natural hues. The chroma screen helps to ensure that the non-primary colors are used mostly at the outer boundaries of the gamut, less often in the middle areas, very little near the gamut core, and not at all within the core itself where the primary colors are dominant. Any color patches with values that violate these criteria are discarded."* column 9, lines 23-40).

Regarding claim 16; Pop '058 discloses a color separation method wherein determination of the extended chromatic color and the outermost shell color separation ink quantity set is performed so as to additionally meet the following condition: (iii) total ink quantity of the outermost shell color separation ink quantity set for reproducing the extended chromatic color is the smallest possible (*"Next, a chroma screen is applied only to non-primary (ROBG) colors (FIG. 8). The purpose of this screen is to ensure that only primary colors are used near the neutral areas of the gamut; that is, it is not preferable to use non-primary inks to reproduce colors where primary inks will suffice because non-primary inks are needed to extend the gamut volume. The core of the gamut is where the primaries alone are used, with CMY colors residing at the top and middle of the gamut and black gradually filling in at the bottom. Non-primaries are restricted to the outside portions of the gamut, in the area surrounding the core, adding additional gamut volume and surface area near their respective natural hues. The chroma screen helps to ensure that the non-primary colors are used mostly at the outer boundaries of the*

gamut, less often in the middle areas, very little near the gamut core, and not at all within the core itself where the primary colors are dominant. Any color patches with values that violate these criteria are discarded." column 9, lines 23-40).

Regarding claim 19; Kita '579 discloses a color separation method wherein the ink set includes black ink, and the step (b) comprises the step of calculating a corrected input color composed of a plurality of chromatic primary color components which are decreased so as to produce a black component by means of an under color removal process for the black ink on the input color, and wherein the reproduction color is determined according to the corrected input color ("*An object of the invention is to provide a color image processing method and apparatus which can perform correct color reproduction by a simple calculation without the need of empirical parameter adjustments, and which can perform black addition and under color removal without causing an unnatural chroma gap between an achromatic area and a chromatic area.*" column 2, lines 50-56).

Examiner Notes

6. The Examiner cites particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested that, in preparing responses, the applicant fully considers the references in its entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or as disclosed by the Examiner.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARCUS T. RILEY whose telephone number is (571)270-1581. The examiner can normally be reached on Monday - Friday, 7:30-5:00, est.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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